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ABSTRACT

This report summarizes the results of a survey of doctoral departments in U.S. universities in the winter of 1970-71. The study was conducted to determine the current employment status of recent recipients of the doctorate and postdoctoral degrees in the fields of science and engineering. In addition to tabulated data from the survey, the report contains background data from the Doctorate Records File that indicates long-term trends in the specified fields. The evidence of the survey shows that it was more difficult for the doctorate recipients and postdoctorals of 1970 to obtain satisfactory jobs than for those of 1969. Both underemployment and unemployment essentially doubled from 1969 to 1970. Translated into numbers of individuals on a national basis, it is estimated that about 225 Ph.D.'s of 1970 in the survey fields held jobs that did not utilize their graduate training and about 285 were unemployed. (HS)

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EMPLOYMENT OF NEW PhD's AND POSTDOCTORALS IN 1971

NATIONAL RESEARCH COUNCIL

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EMPLOYMENT OF NEW PhD's AND POSTDOCTORALS IN 1971

A SURVEY REPORT

Prepared in the Manpower Studies Branch

Office of Scientific Personnel
National Research Council
Washington, D.C.

OSP-MS-5
August 1971

HIGHLIGHTS

- The chairmen of 2,364 U.S. PhD-granting departments (75% of the total) in the natural and social sciences, mathematics, and engineering reported the employment status of their doctorate recipients of academic years 1969 and 1970. Chairmen with postdoctoral appointees also furnished information on the employment of those who were in residence in academic years 1969, 1970, and 1971.

- Employment status in mid-winter 1971 of PhD's of academic year 1970:

Received a postdoctoral appointment	14.3%
Employed in appropriate work in U.S.	70.2
Left the U.S.	8.3
Employed in positions which did not utilize graduate training	1.2
Unemployed (includes those seeking and those not seeking employment)	1.6
Serving in military, or other status	0.6
Employment status unknown	3.8

- Employment status in mid-winter 1971 of PhD's who had been in postdoctoral training in academic year 1970. (Excludes those who were still holding the postdoctoral appointment.)

Took another postdoctoral appointment	14.0%
Employed by academic institutions	52.9
Employed by nonacademic institutions	18.8
Employed in inappropriate position	0.9
Unemployed (includes those seeking and those not seeking employment)	2.2
Employment status unknown	11.2

- Differences exist among fields of specialization. The 1970 PhD's and postdoctorals in mathematics and geosciences had the lowest unemployment rate and physicists had the highest -- 2.9% of the PhD's and 3.3% of the postdoctorals.

PREFACE

This report summarizes the results of a survey of doctoral departments in U.S. universities in the winter of 1970-71 to determine the current employment status of recent recipients of the doctorate and of immediate postdoctorals in the sciences and engineering. It does not attempt to discuss the employment situation of older doctoral scientists and engineers. In addition to tabulated data from the survey, the report contains background data from the Doctorate Records File to indicate long-term trends in these fields. The text deals with the significance of the findings and indicates where the reader must be especially cautious in interpreting the results.

The 1970-71 survey is the second such study conducted by the National Research Council with the cooperation of the chairmen of doctoral departments and the graduate deans. Other surveys will be made in the future to provide current data on the utilization of those who have just emerged from the long and demanding process of graduate education.

The situations of new PhD's are only a part of the story, but one to which this office was able to address itself readily. Unemployment among older doctoral scientists and engineers seems to be more prevalent and persistent than that among recent recipients of the doctorate. Studies conducted elsewhere are beginning to throw light on the problems facing older people who have lost their jobs. Such studies, together with this one, promise to make available more useful and more comprehensive data about the total situation.

We are grateful to the departmental chairmen who responded so well to our requests for not inconsiderable amounts of information. Doctorate recipients themselves and the graduate deans were also of great assistance in providing data reported here.

We thank the National Science Foundation for supporting the analysis of data from the departmental survey. The Survey of Earned Doctorates is supported jointly by the National Science Foundation, the U.S. Office of Education, the National Endowment for the Humanities, and the National Institutes of Health.

Lindsey R. Harmon, Director of Research in the Office of Scientific Personnel, and Clarebeth Maguire, Coordinator of Manpower Studies, were responsible for planning and carrying out the survey and for the analyses of data. Herbert Soldz, Doris Rogowski, and many other members of the staff also contributed greatly to the completion of this task.

Inquiries about the survey and suggestions for modifications in the future will be welcomed. They should be directed to Dr. Harmon.

William C. Kelly
Director, Office of
Scientific Personnel

August 1, 1971

INTRODUCTION

Academic year 1969-70 witnessed the granting of the largest number of doctoral degrees in the history of the United States: a total of 29,436 earned doctorates, up 14% from the preceding year.[1] Graduate education was amply fulfilling national goals set with great urgency in the early 1960's. The year 1969-70 also saw a tightening of the job market for new PhD's. Both unemployment and underemployment were present within this group, which had perennially been too small for national needs. Although inability to obtain satisfactory jobs was limited to a small percentage of recent doctorate recipients, concern increased about the possibility of future imbalance in supply and demand.

The present report, based on surveys by the National Research Council, brings up to date an earlier report[2] about the employment of recent recipients of the doctorate and extends it to the employment of former postdoctoral appointees. Postdoctorals were included because of apprehension that many of them might be retained in their appointments in a "holding pattern" because of lack of employment opportunities. The surveys emphasized the fields of science and engineering, but data were also collected from recipients of doctorates in the arts and humanities. We did not attempt to gather information about the employment of older scientists and engineers, and we must emphasize that throughout this report the findings have to do only with recent recipients of the doctorate.

Questions the survey sought to answer were, for example: what percentage of the doctorate recipients of 1969 and 1970 in the sciences and engineering were unemployed and what percentage were employed in jobs that did not sufficiently utilize their graduate education? What percentage of postdoctoral appointees were being retained in their graduate or postdoctoral departments because of lack of opportunity elsewhere? How had foreign students been affected by recent changes in the employment situation? This report will attempt to provide answers to these and related questions within the limits imposed by the survey techniques used.

DEPARTMENTAL SURVEY OF DOCTORAL EMPLOYMENT

On 11 December 1970 questionnaires were mailed to the chairmen of 3145 academic doctoral departments in the United States in the physical and biological sciences, mathematics, engineering, and the social and behavioral sciences. Although the questionnaire required almost five times as much information for its completion as that used in the previous year, it was completed and returned by 2364 departments---a return rate of 75.2%---by March 8, 1971. Together, these departments accounted for 70.8% of the total number of doctorates awarded in 1970 in the fields surveyed.

The responding departments were judged to be representative of the national population. The response was analyzed by field and institutional size (based on total numbers of doctorates awarded). The characteristics of the responding group were also compared with those of a larger sample of the same national population. Random response variations were found, but no evidence of significant bias.

Several checks were made on the reliability of the reporting. Comparing the reporting last year of an unambiguous datum (the number of PhD's granted by the department) with that of the same datum this year, we found that the departments that responded both years gave replies that correlated with each other quite satisfactorily: the overall correlation coefficient was 0.96. On the other hand, questions with a more subjective element in them---those having to do with "inappropriate" employment or the purposes of a postdoctoral appointment, for example---were shown by a small-sample follow-up by telephone and by the comments of respondents to have elicited less reliable replies. Part of the difficulty can be traced to limitations in the questionnaire used and part to limitations in the information-collecting process within the departmental offices. The effect was not to invalidate the results---the questionnaires were completed conscientiously, and apparent ambiguities were resolved by further queries to the departments---but to necessitate caution in interpreting the more highly disaggregated statistics. More detailed information on the representativeness and reliability of the results is available from the Office of Scientific Personnel.

To find out about the current employment status (as of mid-winter 1970-71) of new PhD's (or equivalent), the departments were asked first

to report the total number of their doctoral graduates in each of the academic years 1968-69 and 1969-70 and then to distribute each of these groups among the following mutually exclusive categories: (a) currently employed in the United States in activities that appropriately utilize their graduate training; (b) in military service; (c) employed in the U.S. in positions that do not utilize their graduate training; (d) have left the United States for other than postdoctoral training; (e) are unemployed and not seeking employment; (f) are unemployed and seeking employment; (g) are in postdoctoral training; and (h) present status unknown. "Appropriate" was defined as including a faculty or research-staff appointment in any university, college, or junior college, a research or research administration position in industry, government, or elsewhere, or any professional position which was the deliberate choice of the graduate.

Across all fields of science and engineering and institutions of all sizes, the department chairmen reported that 9.7% of the PhD's of 1969 (that is, academic year 1968-69), and 14.3% of the PhD's of 1970 (academic year 1969-70), were in postdoctoral training in the mid-winter of 1970-71 (Table 1). As in our previous report, we remind the reader that the greater percentage in postdoctoral work in 1970 than in 1969 is due to both the effect of two-year tenures of some 1969 graduates and the effect of increases in numbers of immediate postdoctorals. Of the 1969 graduates, 75.3%, and of the 1970 graduates, 70.2% were employed in civilian positions in the United States in work that was appropriate to their graduate training. Of the 1969 graduates, 7.9% had left the United States, as had 8.3% of the 1970 graduates. Of the 1969 graduates, about 0.7% were employed in jobs that did not utilize their graduate training, as were 1.2% of the 1970 graduates. About ½ of 1% of the graduates of each year were unemployed and not seeking employment, while 0.5% of the 1969 graduates and 1.1% of the 1970 graduates were unemployed and seeking jobs. Altogether, in the categories of unemployment and underemployment, there were 1.6% of the 1969 graduates and 2.8% of the 1970 PhD's. About ½ of 1% of each year's graduates were in military service (some having been sent to graduate school by their military departments). In addition to all these categories of reported training, employment, and unemployment, the chairmen reported that the status of 5.1% of the 1969 graduates and 3.8% of the 1970 graduates was unknown.

Table 1 provides percentages and numbers by field. The right-hand

Table 1

Percentages and Numbers of PhD Graduates of Academic Years 1968-69 and 1969-70 in Various Categories of Activity, Midwinter 1970-71, by Field

Field of Specialization	Academic Year		Postdoc Training	U.S.-Empl., Approp Work	Left U.S.	Skills Not Utilized	Unemployed: Not Seeking	Unemployed: Seeking	Other-Mil. Svc., etc.	Unknown	Survey Total	Doctorate Total (% in Survey)
Mathematics	69	N	9	744	65	5	2	1	2	33	861	1063
		%	1.0	86.4	7.5	0.6	0.2	0.1	0.2	3.8		81.0
	70	N	20	848	81	9	5	7	1	20	991	1218
		%	2.0	85.6	8.2	0.9	0.5	0.7	0.1	2.0		81.4
Physics	69	N	147	795	81	12	3	13	8	45	1104	1452
		%	13.3	72.0	7.3	1.1	0.3	1.2	0.8	4.1		76.0
	70	N	228	823	103	27	8	30	17	51	1287	1657
		%	17.7	63.9	8.0	2.1	0.6	2.3	1.3	4.0		77.7
Chemistry	69	N	338	1067	60	8	7	14	12	77	1583	1947
		%	21.4	67.4	3.8	0.5	0.4	0.9	0.7	4.9		81.3
	70	N	507	1007	86	23	5	22	11	66	1727	2223
		%	29.4	58.3	5.0	1.3	0.3	1.3	0.6	3.8		77.7
Geosciences	69	N	19	295	39	5	0	0	0	11	369	502
		%	5.1	79.9	10.6	1.4	0.0	0.0	0.0	3.0		73.5
	70	N	35	316	36	7	1	2	3	10	410	509
		%	8.5	77.1	8.8	1.7	0.2	0.5	0.8	2.4		80.6
Engineering	69	N	44	2074	182	16	3	7	13	196	2535	3234
		%	1.7	81.8	7.2	0.6	0.1	0.3	0.5	7.7		78.4
	70	N	116	2185	244	30	3	39	12	116	2745	3432
		%	4.2	79.6	8.9	1.1	0.1	1.4	0.5	4.2		80.0
Total, EMP Fields	69	N	557	4975	427	46	15	35	35	362	6452	8198
		%	8.6	77.1	6.6	0.7	0.2	0.5	0.5	5.6		78.7
	70	N	906	5179	550	96	22	100	44	263	7160	9039
		%	12.7	72.3	7.7	1.3	0.3	1.4	0.6	3.7		79.2
Biosciences	69	N	531	1688	286	25	24	6	16	103	2679	4116
		%	19.8	63.0	10.7	0.9	0.9	0.2	0.6	3.8		65.1
	70	N	859	1542	283	41	26	23	30	118	2922	4564
		%	29.4	52.8	9.7	1.4	0.9	0.8	1.0	4.0		64.0
Psychology	69	N	38	891	35	4	6	10	1	41	1026	1728
		%	3.7	86.8	3.4	0.4	0.6	1.0	0.1	4.0		59.4
	70	N	67	939	31	6	8	17	4	33	1105	1883
		%	6.1	85.0	2.8	0.5	0.7	1.5	0.3	3.0		58.7
Other Social Sciences	69	N	5	1254	172	4	4	4	6	96	1545	2296
		%	0.3	81.2	11.1	0.3	0.3	0.3	0.4	6.2		67.3
	70	N	14	1409	204	16	5	3	10	76	1737	2766
		%	0.8	81.1	11.7	0.9	0.3	0.2	0.6	4.4		62.8
Total, All Sciences	69	N	1131	8808	920	79	49	55	58	602	11702	16338
		%	9.7	75.3	7.9	0.7	0.4	0.5	0.5	5.1		71.6
	70	N	1846	9069	1068	159	61	143	88	490	12924	18252
		%	14.3	70.2	8.3	1.2	0.5	1.1	0.6	3.8		70.8

Table 2

Percentages of 1969 and 1970 PhD's in Various Employment Categories in 1971, by Institution Size*, in Three General Fields

Category of Employment or Activity	Field Group	10 Largest Universities		Next 15 Universities		Next 45 Universities		Remaining 160 Universities		Total, All Universities	
		1969	1970	1969	1970	1969	1970	1969	1970	1969	1970
Appropriate Employment in USA	EMP	72.7	71.0	74.8	69.0	79.5	74.3	81.1	74.3	77.1	72.3
	Bioscncs.	60.2	48.6	60.8	52.6	63.1	53.8	67.3	55.0	63.0	52.8
	Psy. & S.S.	84.4	81.3	76.7	78.3	86.1	84.5	86.1	86.0	83.4	82.6
	Total	72.8	68.7	72.7	68.0	76.7	71.7	78.6	71.6	75.3	70.2
Military Service	EMP	0.2	0.5	0.6	1.0	0.9	0.4	0.3	0.6	0.5	0.6
	Bioscncs.	0.3	0.6	0.6	0.2	0.6	1.0	0.5	0.9	0.5	0.8
	Psy. & S.S.	0.2	0.6	0.0	0.0	0.6	0.7	0.2	0.6	0.3	0.5
	Total	0.2	0.6	0.5	0.6	0.7	0.6	0.3	0.6	0.5	0.6
Work Does Not Utilize Graduate Training	EMP	0.9	0.8	0.6	0.9	0.5	1.5	0.9	2.2	0.7	1.3
	Bioscncs.	0.9	0.9	1.4	0.4	0.6	1.7	1.1	2.1	0.9	1.4
	Psy. & S.S.	0.2	0.3	0.5	0.6	0.1	1.5	0.7	0.2	0.3	0.8
	Total	0.7	0.7	0.7	0.7	0.4	1.5	0.9	1.8	0.7	1.2
Left the United States	EMP	8.8	10.7	6.3	8.1	6.1	6.5	5.3	5.8	6.6	7.7
	Bioscncs.	11.1	11.5	10.4	12.7	11.9	8.3	8.7	8.0	10.7	9.7
	Psy. & S.S.	8.1	10.4	11.9	12.1	7.3	6.5	4.1	4.2	8.1	8.3
	Total	9.1	10.8	8.4	9.9	7.9	6.9	5.9	6.1	7.9	8.3
Unemployed and NOT Seeking Work	EMP	0.4	0.6	0.1	0.1	0.1	0.3	0.3	0.3	0.2	0.3
	Bioscncs.	0.5	1.3	0.6	0.4	1.3	1.1	0.8	0.7	0.9	0.9
	Psy. & S. S.	0.3	0.6	0.8	0.2	0.2	0.3	0.2	1.0	0.4	0.5
	Total	0.4	0.7	0.4	0.1	0.5	0.5	0.4	0.5	0.4	0.5
Unemployed and Seeking Work	EMP	0.4	1.2	0.4	1.4	0.7	1.3	0.7	1.7	0.5	1.4
	Bioscncs.	0.5	0.9	0.2	0.6	0.2	0.9	0.0	0.7	0.2	0.8
	Psy. & S. S.	0.6	0.1	1.0	2.1	0.1	0.1	0.7	1.0	0.5	0.7
	Total	0.5	0.9	0.5	1.4	0.4	0.9	0.5	1.3	0.5	1.1
In Postdoctoral Training in U. S.	EMP	7.6	12.2	10.1	14.4	8.4	12.3	8.5	11.9	8.6	12.7
	Bioscncs.	21.1	30.3	23.1	30.8	18.1	28.5	18.8	28.8	19.8	29.4
	Psy. & S. S.	1.1	1.1	0.8	2.6	2.2	3.6	2.7	4.0	1.7	2.9
	Total	8.9	13.4	10.4	14.9	9.5	14.2	10.0	14.7	9.7	14.3
Status Unknown	EMP	9.0	3.0	7.0	5.2	3.8	3.5	2.8	3.3	5.6	3.7
	Bioscncs.	5.4	5.8	2.6	2.1	4.2	4.3	2.7	3.5	3.8	4.0
	Psy. & S. S.	5.2	5.6	8.3	4.2	3.4	2.8	5.2	3.1	5.3	3.8
	Total	7.4	4.2	6.5	4.3	3.8	3.5	3.2	3.3	5.1	3.8

*Measured by total PhD output across all fields.

column gives the number of PhD's granted in each field, by year, for all institutions combined, as recorded in the Doctorate Records File of the Office of Scientific Personnel. This file, derived from the Survey of Earned Doctorates, which is discussed below, is complete (having 99+% coverage of all fields and institutions), and thus affords data on the extent of coverage of other surveys, such as the current one. The percentage of PhD's included in the present survey of employment is recorded below the Doctorate Records number in Table 1 for each field. When the institutions of the graduating PhD's are sorted by size, measured by total PhD output across all fields, some differences appear in the above categories, but the differences are rather small and unreliable.

Table 2 provides data by size of institution in three general field groups: EMP fields (engineering-mathematics-physical sciences), bioscience fields, and all social sciences combined, including psychology. Both 1969 and 1970 PhD's show different employment patterns related to institution size. "Appropriate employment" is recorded somewhat more often for the smaller institutions for graduates of both years, in the physical and biological sciences. In the social sciences the trend is in the same direction, but not so clearcut. Military service is not systematically related to institution size, nor is unemployment, either for those who are seeking work or those who are not. There is a hint of a negative relationship of institution size to underemployment, i.e. that which does not utilize skills acquired in graduate school, chiefly in the 1970 graduates in the natural sciences. That is, the smaller schools somewhat more often reported inappropriate employment, up to 2.2% in the EMP fields in 1970 for graduates of the 160 smallest institutions.

Postdoctoral training is unrelated to institution size except in the social sciences, where it is the smaller institutions which send the largest proportion for further training. But even for these institutions, only 4% or fewer of the social science graduates engage in postdoctoral training, as compared with 29% in the biosciences.

Leaving the United States after the PhD is more characteristic of the graduates of the larger institutions, largely because they have a larger proportion of foreign students, as indicated by the following table.

Percentage of Foreign Students Among Science Doctorates, by Institution-Size* Category

Institution Size	1969	1970
10 Largest	17.8	21.3
Next 15	18.0	18.8
Next 45	15.3	15.3
Remaining 160	15.6	16.1
Total, All Institutions	16.5	17.6

*Measured by total PhD output

Analysis by citizenship (Table 3) indicates that about 2.1% of U.S. citizens and 36.9% of foreign citizens among the PhD's of 1969 and 1970 combined left the United States after receiving the doctorate, for reasons other than postdoctoral study. This percentage varies somewhat by field, being higher in the biosciences and social sciences, lower in psychology and the physical sciences. The percentage going abroad is of course negatively correlated with the percentage reported to be in suitable jobs in the United States. For 1969, the U.S.- and foreign-citizen percentages in suitable jobs are, respectively, 81.4% and 44.6%; for 1970 the percentages are 76.3% and 41.6%. The percentages in postdoctoral training are rather similar: of 1969 graduates, 9.9% of U.S. citizens and 8.7% of foreign citizens are in postdoctoral training; for 1970 the percentages are 14.4% and 13.5% for U.S. and foreign citizens, respectively. With the exception of the EMP fields in 1970, the percentage of U.S. citizens in postdoctoral training is always higher than that of foreign citizens.

Unemployment and employment in work that does not utilize skills acquired in graduate school are generally greater for foreign citizens than for U.S. citizens. This is not uniformly true, as the small numbers make for statistical unreliability. Combining underemployed and unemployed, the data for 1969 are 1.5% for U.S. citizens and 1.8% for foreign citizens. Among the 1970 graduates, the percentages are greater for both groups: 2.6% for U.S. citizens and 3.8% for foreign citizens. As expected, the "unknown" status rate is lower for U.S. than for foreign citizens: 4.7% vs. 7.5% for the 1969 graduates and 3.6% vs. 4.7% for the 1970 graduates.

Table 3

Percentage Distribution, 1971 Activity of 1969 and 1970 Graduates, by Citizenship, by Gross Field Categories

1971 Activity	Citizenship	1969 Graduates EMP	Bio	Soc. Sci.	Total	1970 Graduates EMP	Bio	Soc. Sci.	Total
Postdoctoral Training	U.S.	8.8	20.8	1.8	9.9	12.4	30.9	3.0	14.4
	Foreign	8.0	15.3	0.4	8.7	13.6	22.1	1.6	13.5
Appropriate Jobs in USA	U.S.	82.8	69.8	89.0	81.4	78.4	58.7	88.5	76.3
	Foreign	51.8	31.0	36.7	44.6	47.6	23.7	42.5	41.6
Employed in Inappropriate work	U.S.	0.6	1.0	0.4	0.6	1.3	1.2	0.8	1.2
	Foreign	1.3	0.4	0.0	0.9	1.3	2.6	0.8	1.5
Unemployed, Total	U.S.	0.7	1.1	1.0	0.9	1.4	1.6	1.2	1.4
	Foreign	0.8	1.3	0.4	0.9	2.7	2.0	0.8	2.3
Left U.S.	U.S.	1.6	2.5	2.4	2.0	2.0	2.7	2.3	2.2
	Foreign	28.8	48.8	54.9	37.4	30.5	44.2	48.5	36.4
All Other	U.S.	0.7	0.8	0.3	0.5	1.0	1.1	0.6	0.9
	Foreign	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.0
Unknown	U.S.	4.8	4.0	5.1	4.7	3.5	3.8	3.6	3.6
	Foreign	9.2	3.2	7.6	7.5	4.2	5.3	5.8	4.7
Total Number in Sample	U.S.	5,262	2,208	2,296	9,766	5,740	2,429	2,477	10,646
	Foreign	1,190	471	275	1,936	1,420	493	365	2,278

Background Data on Immediate Post-PhD Activity from the Survey of Earned Doctorates

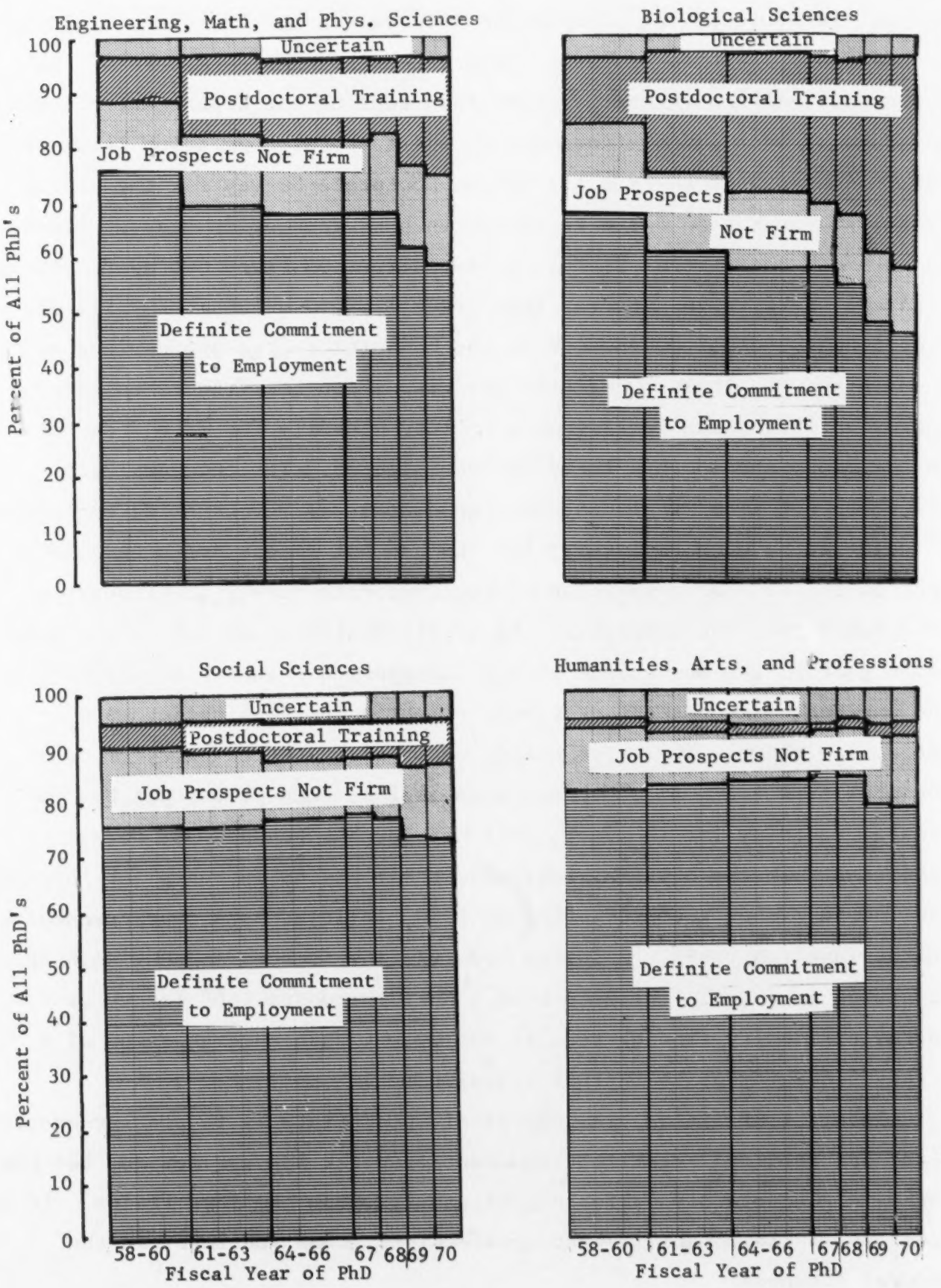
Background information with which these statistics may be compared and put into historical perspective is provided by the Survey of Earned Doctorates.[3] It furnishes a different point of view---that of the doctorate recipient himself rather than that of the department chairman. Coverage of each annual increment to the doctoral population is almost 100%. Analysis of the results of the Doctorate Survey for the period 1958-1970 shows some definite trends in post-graduation plans. Differences among the several fields of specialization stand out quite starkly. Figure 1 shows these data for four general field groups: EMP fields, biosciences, social sciences, and the humanities-arts-professions group.

In the EMP fields, definite pre-graduation commitments to regular employment have been falling more or less steadily for over a decade. In the biosciences, this trend is even steeper. The category "job prospects not firm" includes those graduates who were seeking employment, or negotiating with employers, but who had not made a definite commitment at the time of completion of the Doctorate Survey questionnaire. (The modal time for completing the questionnaire is spring of the academic year). The percentage in this category has increased slightly in the physical sciences and decreased slightly in the biosciences over the period shown. The major change shown is in the category of post-doctoral training. In the bioscience fields, this percentage has increased steadily for 13 years, until it now has reached 38% of all graduates. In the physical sciences, there was an increase for the 1958-1967 period, then a constriction in 1968, followed by a sharp expansion in the last two years. Opinions from various sources suggest that this expansion is more in the nature of a "holding operation" for those having difficulty finding regular employment than an expression of a stronger commitment to further training.

In all four fields, the degree of uncertainty as to post-graduation plans has remained relatively constant over the 13-year period, but the degree of uncertainty varies significantly among the four fields. It is greatest in the humanities-arts-professions group and least in the natural sciences.

Figure 1

EXPECTED POST-GRADUATE ACTIVITY, BY FIELD, 1958-1970



Postdoctorals

Returning to the results of the departmental survey, we next consider the situations of the postdoctoral appointees. The postdoctoral was defined as one holding an "appointment of a temporary nature at the postdoctoral level...intended to offer an opportunity for continued education and experience in research, usually, though not necessarily, under the supervision of a senior mentor. The appointee may have a research doctorate (e.g. PhD, ScD) or professional doctorate (e.g. MD, DVM) or other qualifications which are considered equivalent in the circumstances. A person may have more than one postdoctoral appointment during his career." The definition is the one used earlier in the Study of Postdoctoral Education in the United States.[4]

A total of 6452 postdoctorals were reported in residence in 1969 in all departments in the survey. This number increased by 13.7%, to 7339 in 1970, but decreased in the present academic year by 1.9% to a total of 7197 postdoctorals (Table 4). In academic year 1969, the 10 largest universities (the first 10 in rank order of total PhD output) had 24.5% of all postdoctorals. This fell to 22.3% in academic year 1970, and to 21.9% in the present academic year. Universities in the second tier (the next 15) expanded their appointment of postdoctorals from 26.1% of the U.S. total in 1969 to 27.9% in 1970, but dropped back to 26.0% this year. The third-tier institutions (the next 45) appointed 28.4% of the postdoctorals in 1969, 29.0% in 1970, and 30.1% in the current year. The remaining 160 institutions accounted for 21.0% of all postdoctorals in 1969, 20.8% in 1970, and 21.9% in the current year. The picture is one of a gradual shift, the largest universities showing a relative drop, and the smaller ones a relative gain in percentage of all postdoctorals.

The postdoctoral picture was not the same for U.S. and foreign citizens, however. Last year saw an increase of 17.6% over the previous year for U.S. citizens, and this year a further slight increase of 1.8%. For foreign postdoctorals, however, last year's increase was only 9.3%, while this year showed a drop of 6.5%. The percentage of foreign citizens among the postdoctorals thus decreased from 46.9% in 1969 to 45.1% in 1970 and to 43.0% in academic year 1971, as these diminishing opportunities were allotted differentially in a

Table 4

Postdoctorals at Responding Institutions,
by Citizenship, Institution Size*, and Academic Year

Citizenship Category		Academic Year 1969					Academic Year 1970					Academic Year 1971				
		10 Largest	Next 15	Next 45	Rem. 160	Total	10 Largest	Next 15	Next 45	Rem. 160	Total	10 Largest	Next 15	Next 45	Rem. 160	Total
U.S. Citizens	N	817	947	996	665	3425	898	1200	1160	771	4029	886	1089	1265	861	4101
% by Institution Size		23.9	27.6	29.1	19.4	100.0	22.3	29.8	28.8	19.1	100.0	21.6	26.6	30.8	21.0	100.0
% of All Postdoctorals		51.7	56.3	54.2	49.1	53.1	54.8	58.7	54.6	50.4	54.9	56.1	58.2	58.3	54.6	57.0
Foreign Citizens	N	764	736	840	687	3027	740	845	966	759	3310	693	783	904	716	3096
% by Institution Size		25.2	24.3	27.8	22.7	100.0	22.4	25.5	29.2	22.9	100.0	22.4	25.3	29.2	23.1	100.0
% of All Postdoctorals		48.3	43.7	45.8	50.8	46.9	45.2	41.3	45.4	49.6	45.1	43.9	41.8	41.7	45.4	43.0
Total	N	1581	1683	1836	1352	6452	1638	2045	2126	1530	7339	1579	1872	2169	1577	7197
% by Institution Size		24.5	26.1	28.4	21.0	100.0	22.3	27.9	29.0	20.8	100.0	21.9	26.0	30.1	21.9	100.0
Changes, in % from year to year	U. S. Citizens						+9.9	+26.7	+16.5	+15.9	+17.6	-1.3	-9.3	+9.1	+11.7	+1.8
	Foreign Citizens						-3.1	+14.8	+15.0	+10.5	+ 9.3	-6.4	-7.3	-6.4	- 5.7	-6.5
	Total						+3.6	+21.5	+15.8	+13.2	+13.7	-3.6	-8.5	+2.0	+3.1	-1.9

*Measured by total PhD output across all fields.

contracting employment market. The same general trend is evident across universities of all sizes. The changes are gradual, for the most part, but uniform in direction.

The sources from which the postdoctorals came are shown in Table 5 by size of institution and academic year. Roughly one third in each academic year were held over from the previous year because their training program, or "apprenticeship period" as some prefer to call it, was incomplete. This percentage varies in a rather unsystematic fashion from one academic year to another and from one size category to another: from a low of 25.5% in the smallest institutions in 1969 to a high of 38.5% in the next-to-largest institutions in 1971. The number held over because of the lack of a suitable employment opportunity elsewhere is small, but increasing, from 1.4% in 1969 to 2.6% in 1970 to 4.8% in the current year. These percentages vary systematically by institution size, being lowest for the large institutions and highest for the smallest schools; all show similar increases from year to year.

Approximately 7% of the postdoctorals each year are new appointees from the institution's own recent PhD's. This percentage varies somewhat by institution-size category---apparently only in a random fashion---and tends to increase from year to year. Slightly over half (51.0%) of the postdoctorals were new appointees from outside the appointing department in 1969. This source has dropped in succeeding years to 48.5% in 1970 and to 44.3% this year. A little over 2.5% were characterized as being "other" in origin, chiefly by chairmen who objected to the phrase "because their training was incomplete." They were mostly 2-year appointees who were in their second year of residence at any given time. The origin of about 6% of the postdoctorals was not given on the questionnaires, varying slightly but unsystematically from year to year and by institution size.

Table 5

Sources of Postdoctorals at Responding Institutions
by Institution Size*and Academic Year

Institution Size			Retained Because Training was Incomplete	Retained for Lack of Suitable Employment Elsewhere	New Postdoctorals From Own Department	New Postdoctorals From Outside Own Department	Other Sources	Un-known	Total Number
	1969	N	559	19	97	758	50	98	1581
10		%	35.4	1.2	6.1	47.9	3.2	6.2	100
Largest	1970	N	568	28	111	790	45	96	1638
Instit.		%	34.7	1.7	6.8	48.2	2.7	5.9	100
	1971	N	564	47	96	706	57	109	1579
		%	35.7	3.0	6.1	44.7	3.6	6.9	100
	1969	N	591	13	113	811	49	106	1683
Next		%	35.1	0.8	6.7	48.2	2.9	6.3	100
15	1970	N	747	45	160	919	68	106	2045
Instit.		%	36.5	2.2	7.8	44.9	3.3	5.2	100
	1971	N	721	92	134	757	79	89	1872
		%	38.5	4.9	7.2	40.4	4.2	4.8	100
	1969	N	598	29	130	930	14	135	1836
Next		%	32.6	1.6	7.1	50.7	0.8	7.4	100
45	1970	N	713	60	148	1039	25	141	2126
Instit.		%	33.5	2.8	7.0	48.9	1.2	6.6	100
	1971	N	743	109	148	998	26	145	2169
		%	34.3	5.0	6.8	46.0	1.2	6.7	100
	1969	N	345	30	84	789	49	55	1352
Remaining		%	25.5	2.2	6.2	58.4	3.6	4.1	100
160	1970	N	435	55	91	809	50	90	1530
Instit.		%	28.4	3.6	5.9	52.9	3.3	5.9	100
	1971	N	501	99	142	727	41	67	1577
		%	31.8	6.3	9.0	46.1	2.6	4.2	100
	1969	N	2093	91	424	3288	162	394	6452
Total,		%	32.4	1.4	6.6	51.0	2.5	6.1	100
All	1970	N	2463	188	510	3557	188	433	7339
Instit.		%	33.6	2.6	6.9	48.5	2.6	5.9	100
	1971	N	2529	347	520	3188	203	410	7197
		%	35.1	4.8	7.2	44.3	2.8	5.7	100

*Measured by total PhD output across all fields.

Employment of Postdoctorals

Table 6 shows that, of the total of 6452 postdoctorals reported in residence in the responding departments in 1969, 3368 or 52.2% had left the department at the time the current questionnaires were returned. Of the 7339 in residence in 1970, 3364 or 45.8% had left, and of the 7197 in residence in 1971, 1082 or 15.0% had already left. The chief locus of employment was academic institutions. Of the postdoctorals of 1969 who had left, 53.9% went into academic employment; this percentage dropped slightly (to 52.9%) in 1970. Of the 1082 who have left during 1971, 45.3% went into academic jobs. The squeeze on academic budgets seems to be having an effect.

The second largest source of jobs for the former postdoctorals was "appropriate nonacademic positions." This category accounted for 20.6% of placements in 1969, 18.8% in 1970, and 17.8% in the current year. Further postdoctoral training elsewhere has accounted for an increasing proportion of placements, rising from 10.8% in 1969 to 14.0% in 1970 and 16.5% so far this year. These three categories combined---all in what can justifiably be considered suitable employment---account for 85.3% of the 1969 placements, 85.7% of the 1970 placements, but only 79.6% of those of the current year. This corresponds with other indications in comments made on last year's questionnaire and some this year. The departments reported last year that although placements of new PhD's were more difficult, they were being made, but that the difficulties were sharply increasing and that next year (1971) would be worse.

The number of postdoctorals reported to be unemployed and seeking employment, although small, rose sharply across the three years reported in this survey. There was also an increase in those reported unemployed but not seeking employment---a phenomenon that is also observed in the labor market for those of lesser skill levels. Some people withdraw from the labor market when it is difficult to find jobs, and re-enter later when opportunities are more plentiful. The unemployed (those seeking and not seeking jobs) were, respectively, 0.6% and 0.6% in 1969, 1.3% and 0.9% in 1970, and 4.4% and 0.9% in 1971. In addition, there was a small percentage in inappropriate work, increasing from 0.4% in 1969 to 0.9% in 1970 and 1.0% in 1971. Combining these groups---the unemployed and underemployed---we find the totals are 1.6% in 1969,

Table 6

Employment of Postdoctorals Who Have Left the Department, by Year, by Institution Size*, All Fields Combined

Category of Employment		10 Largest Institutions			Next 15 Institutions			Next 45 Institutions			Remaining 160 Institutions			Total, All Institutions		
		AY 69	AY 70	AY 71	AY 69	AY 70	AY 71	AY 69	AY 70	AY 71	AY 69	AY 70	AY 71	AY 69	AY 70	AY 71
Other Post-doctoral Training	N	56	87	32	95	136	46	107	150	50	105	97	50	363	470	178
	%	6.9	12.3	15.1	11.3	14.5	13.5	11.0	14.7	15.7	14.3	13.9	23.6	10.8	14.0	16.5
Regular Academic Positions	N	456	385	112	471	492	160	522	536	142	366	368	76	1815	1781	490
	%	55.8	54.2	52.8	56.1	52.6	47.1	53.5	52.6	44.7	49.8	52.6	35.8	53.9	52.9	45.3
Suitable, Nonacademic Positions	N	134	105	31	191	195	74	190	177	60	180	157	28	695	634	193
	%	16.4	14.8	14.6	22.7	20.9	21.8	19.5	17.4	18.9	24.5	22.4	13.2	20.6	18.8	17.8
Inappro-priate Work	N	6	7	0	5	11	2	0	8	5	2	3	4	13	29	11
	%	0.7	1.0	0	0.6	1.2	0.6	0	0.8	1.6	0.3	0.4	1.9	0.4	0.9	1.0
Unemployed and Seek-ing Work	N	6	4	8	5	10	10	6	15	8	4	15	22	21	44	48
	%	0.7	0.6	3.8	0.6	1.1	2.9	0.6	1.5	2.5	0.5	2.1	10.4	0.6	1.3	4.4
Unemployed Not Seek-ing Work	N	7	4	1	5	12	5	5	8	4	3	5	0	20	29	10
	%	0.9	0.6	0.5	0.6	1.3	1.5	0.5	0.8	1.3	0.4	0.7	0	0.6	0.9	0.9
Unknown Status	N	152	118	28	68	79	43	146	125	49	75	55	32	441	377	152
	%	18.6	16.6	13.2	8.1	8.4	12.6	15.0	12.3	15.4	10.2	7.9	15.1	13.1	11.2	14.0
Total Who Have Left Department		817	710	212	840	935	340	976	1019	318	735	700	212	3368	3364	1082
Total in Resi-dence, by Aca-demic Year		1581	1638	1579	1683	2045	1872	1836	2126	2169	1352	1530	1577	6452	7339	7197
Percentage Who Have Left Department		51.7	43.3	13.4	49.9	45.7	18.2	53.2	47.9	14.7	54.4	45.8	13.4	52.2	45.8	15.0

*Measured by total PhD output across all fields.

3.1% in 1970, and 6.3% in 1971.

One additional category contained a sizable percentage of postdoctorals: those whose present status was unknown. This group comprised 13.1% of the 1969 postdoctorals, 11.2% of the 1970 postdoctorals, and 14.0% of those who had left postdoctoral positions during 1971.

Minor, but mostly unsystematic, differences occur in the various percentages in the categories of employment and unemployment of postdoctorals when the reports are analyzed in terms of institution size. A somewhat larger proportion of those from the largest institutions go into academic employment, and a somewhat smaller proportion into appropriate nonacademic positions. But the trends for the various types of employment are by no means uniformly correlated with size of institutions.

Field-to-field comparisons in Table 7 for 1970 and 1971, for U.S. citizens and foreign citizens combined, show few marked differences in employment patterns. Leaving the department to go to another postdoctoral appointment occurs somewhat more frequently in the biosciences than in the physical sciences. This may be partly a semantic difference, because the term may be used differently in different fields. The field differences found in academic vs. nonacademic employment follow the usual lines: chemistry and engineering report higher percentages than the other fields in nonacademic (largely industrial) employment. With respect to unemployment and inappropriate employment, there are not enough cases to provide stable differences among the fields. One possible exception is the "unemployed and not seeking" category, which is slightly, but unreliably, higher in the biosciences.

The 1971 data are sparse and afford less reliable field-to-field comparisons. By comparison with 1970, however, some year-to-year differences may be significant. The number entering other postdoctoral appointments in 1971 is up about two percentage points, more or less evenly across all fields. The number going into academic employment is lower; probably this is a seasonal fluctuation, as the data recorded here refer to the mid-winter period, before plans were firm for employment in the fall of 1971. The percentage whose status was unknown was slightly higher than for the 1970 former postdoctorals; the percentages in the various categories of unemployment and underemployment were too unstable to afford reliable comparisons among the several fields. For year-to-year comparisons, the field totals given in Table 6 are more significant.

Table 7

Employment Status of Postdoctorals in Residence in Academic Years 1970 and 1971, Who Have Left Their Departments, by Field of Specialization

Employment Category		Mathematics	Physics	Chemistry	Geo Sciences	Engineering	EMP Total	Bio-Sciences	Psychology	Other Social Sciences	Total All Sciences
		Residents in Academic Year 1970									
Total Who Have Left	N	96	424	851	97	220	1688	1548	62	66	3364
Other Postdoctoral Training	N	7	62	114	7	18	208	257	3	2	470
	%	7.3	14.6	13.4	7.2	8.2	12.3	16.6	4.8	3.0	14.0
Regular Academic Jobs	N	78	224	292	61	97	752	944	42	43	1781
	%	81.3	52.8	34.3	62.9	44.1	44.5	61.0	67.7	65.2	52.9
Appropriate Nonacademic Work	N	1	68	243	20	63	395	221	5	13	634
	%	1.0	16.0	28.6	20.6	28.6	23.4	14.3	8.1	19.7	18.8
Inappropriate Work	N	0	3	8	2	1	14	10	1	4	29
	%	0.0	0.7	0.9	2.1	0.5	0.8	0.6	1.6	6.1	0.9
Unemployed and Seeking Work	N	0	11	18	0	2	31	12	1	0	44
	%	0.0	2.6	2.1	0.0	0.9	1.8	0.8	1.6	0.0	1.3
Unemployed, NOT Seeking Work	N	1	3	4	1	0	9	20	0	0	29
	%	1.0	0.7	0.5	1.0	0.0	0.5	1.3	0.0	0.0	0.9
Status Unknown	N	9	53	172	6	39	279	84	10	4	377
	%	9.4	12.5	20.2	6.2	17.7	16.5	5.4	16.1	6.1	11.2
		Residents in Academic Year 1971									
Total Who Have Left	N	26	122	271	22	64	505	528	25	24	1082
Other Postdoctoral Training	N	2	18	46	2	5	73	98	4	3	178
	%	7.7	14.8	17.0	9.1	7.8	14.5	18.6	16.0	12.5	16.5
Regular Academic Jobs	N	22	46	84	15	30	197	273	6	14	490
	%	84.6	37.7	31.0	68.2	46.9	39.0	51.7	24.0	58.3	45.3
Appropriate Nonacademic Work	N	0	17	87	3	12	119	68	1	5	193
	%	0.0	13.9	32.1	13.6	18.8	23.6	12.9	4.0	20.8	17.8
Inappropriate Work	N	0	3	3	0	0	6	5	0	0	11
	%	0.0	2.5	1.1	0.0	0.0	1.2	0.9	0.0	0.0	1.0
Unemployed and Seeking Work	N	1	8	7	0	6	22	24	1	1	48
	%	3.8	6.6	2.6	0.0	9.4	4.4	4.5	4.0	4.2	4.4
Unemployed, NOT Seeking Work	N	0	1	0	0	0	1	9	0	0	10
	%	0.0	0.8	0.0	0.0	0.0	0.2	1.7	0.0	0.0	0.9
Status Unknown	N	1	29	44	2	11	87	51	13	1	152
	%	3.8	23.8	16.2	9.1	17.2	17.2	9.7	52.0	4.2	14.0

DISCUSSION

The departmental survey in mid-winter of 1970-71 revealed that 1.2% of the PhD's of 1970 in the fields surveyed were underemployed and 1.6% unemployed (both those seeking and those not seeking employment). Translating these percentages into numbers of individuals on a national basis, we estimate that about 225 PhD's of 1970 in the survey fields held jobs that did not utilize their graduate training and about 285 were unemployed. Comparable figures for the doctorate recipients of 1969 in the survey fields were about 110 (0.7%) underemployed and 145 (0.9%) unemployed. Thus the current incidence of underemployment and unemployment was about twice as great for the 1970 graduates as for those of 1969, presumably reflecting both the tightening of the market and the passage of an additional year in the search for jobs by the 1969 graduates.

To separate these effects, we note that in last year's survey,[5] made at a comparable time in the employment search by the PhD's of 1969, 0.7% of the 1969 graduates in the same fields (compared to 1.2% of the 1970 graduates this year) were reported to be underemployed and 1.1% (compared to 1.6%) to be unemployed. The results of the two surveys thus indicate that the 1970 graduates did indeed encounter a more constricted market and also suggest that the percentages of the underemployed and unemployed 1969 graduates did not change greatly over the course of the year 1969-70.

All fields reported greater difficulties from 1968 to 1970 in placing their graduates, but field-to-field differences were generally not large. Physics provided an exception: the percentages of underemployed and unemployed among the 1970 graduates in physics were both almost twice those percentages for all sciences. The percentage of unemployed 1970 PhD's in physics (2.9%) agrees, within the limitations of such surveys, with the figure of 4% reported in a separate survey conducted by the American Physical Society.[6] Comparable data for new PhD's in other fields have not come to our attention.

The data presented here do not reveal the extent to which recent recipients of the doctorate have found employment as the result of the displacement of older doctoral scientists and engineers. Information derived from a survey in one field[7] indicates that, although such a process is not planned, it occurs to a significant extent. Older, higher-salaried people who have lost their jobs are finding that they compete

at a disadvantage with new people, fresh from graduate training and willing to work at lower salaries. Comprehensive data about the employment status of a large sample of doctoral scientists and engineers---including both new PhD's and older people---is now available as a result of a survey conducted by the National Science Foundation in the spring of 1971.[8]

As to the situations of the postdoctorals, we estimate that, on a national basis, about 130 postdoctorals in residence in 1969 in all survey fields (1.4%) were retained in their postdoctoral departments for lack of suitable opportunity elsewhere, 265 (2.6%) of those of 1970, and---as of mid-winter---490 (4.8%) of the postdoctorals of 1971. Thus the number and percentage roughly doubled from year to year.

Of those postdoctorals who left their postdoctoral departments, again estimated on a national basis, about 20 (0.4%) of the postdoctorals of 1969 were underemployed, as were 40 (0.9%) of those of 1970 and 15 (1.0%) of those of 1971. Unemployed postdoctorals (both those seeking jobs and those not seeking them) included about 60 (1.2%) of the postdoctorals of 1969, 105 (2.2%) of those of 1970, and 80 (5.3%) of those of 1971. The numbers and percentages of the underemployed and unemployed roughly doubled from 1969 to 1970. The data for 1971 so far showed that the percentage of the unemployed had more than doubled, but that of the underemployed was almost the same.

Since the survey was synoptic and the categories within each level (doctoral and postdoctoral) were defined as mutually exclusive, we may gather up the foregoing numbers with only a small probability of overlap. Of the PhD's of 1969 and 1970, and the postdoctorals of 1969, 1970, and 1971 in the sciences and engineering, on a national basis, about 400 persons were underemployed, 675 were unemployed, and 880 were postdoctorals in a "holding pattern." To provide a backdrop for these figures, we remind the reader that the total number of doctorates awarded in the fields surveyed was 14,664 in 1968, 16,338 in 1969, and 18,252 in 1970.

Finally, Table 3 indicates that significant percentages of graduates who are U.S. nationals left the country after receiving their doctorates for reasons other than postdoctoral training. The trend is undoubtedly affected by the tightness of the job market---and may indeed constitute a "reverse brain drain"---but we are unable to throw more light on it as a result of this survey. It deserves further study.

SUMMARY

The evidence of the departmental survey of 1971 is that it was more difficult for the doctorate recipients and postdoctorals of 1970 in the sciences and engineering to obtain satisfactory jobs than for those of 1969. Underemployment and unemployment both about doubled from 1969 to 1970. Both also affected a small fraction of the total number of new PhD's in these fields. In spite of the emergence of large numbers of new doctorate recipients each year---with percentage annual increases averaging 12%---the economy has found room for almost all recent recipients of the doctorate. This is perhaps the most significant result of the survey. Various market accommodations are undoubtedly responsible for preventing what would otherwise be a gross oversupply.

Any deficit of jobs must nevertheless be a matter of national concern, and reliance solely on market adjustments to an oversupply would be both callous and unwise. The large national investment in graduate education and the valuable human resources at stake demand that any involuntary underemployment or unemployemnt of doctorate recipients be corrected. Good planning and monitoring are essential for adequate remedial action. The National Board on Graduate Education, which has recently been appointed by the Conference Board of Associated Research Councils, is expected to take as a task of high priority the assessment of long-term national demand and supply of PhD's in all fields as the first step in the many institutional adjustments needed to maintain balance between the two.

Footnotes

1. Office of Scientific Personnel, Summary Report 1970: Doctorate Recipients from United States Universities, National Research Council, Washington, D.C., 1971.

2. Office of Scientific Personnel, "Employment Status of Recent Recipients of the Doctorate," Science, Vol. 168, May 22, 1970, pp. 930-939.

3. The Survey of Earned Doctorates is conducted annually by the Office of Scientific Personnel of the National Research Council with the assistance of graduate deans and the doctorate recipients themselves. The Survey gathers information by means of a questionnaire form that is filled out by the graduates just as they complete all requirements for their doctoral degrees. The data concerning post-graduation plans have been checked by follow-up studies and found to be reliably predictive; they are not, of course, the equivalent of reports after the fact.

4. The Invisible University: Postdoctoral Education in the United States, National Academy of Sciences, Washington, D.C., 1969.

5. loc. cit.

6. Lee Grodzins, "The Manpower Crisis in Physics," American Physical Society Bulletin, Series II, Vol. 16, No. 6, June, 1971, pp. 736-749.

7. Lee Grodzins, loc. cit.

8. National Science Foundation, "Unemployment Rates for Scientists, Spring 1971," Science Resources Studies Highlights, July 2, 1971.

THE QUESTIONNAIRE

with Definition and Instruction Sheet

NATIONAL RESEARCH COUNCIL

Please answer the following questions concerning the status of all those who have recently received earned research doctorates (excluding professional doctorates such as M.D., D.V.M., and D.D.S.) in your department, and regarding your recent postdoctorals. Individuals who received their degrees in interdisciplinary programs should be counted only once by an institution: please confer with the other departments cooperating in such programs to accomplish this. Medical schools with postdoctorals but not granting the Ph.D. should answer only the second page of this form.

THIS INFORMATION WILL BE TREATED AS PRIVILEGED

GRADUATE STUDENTS

(See definitions on accompanying sheet)

			Academic Year 1968–1969	Academic Year 1969–1970	Academic Year 1970–1971	PLEASE DO NOT WRITE IN THIS COLUMN
1. How many new entrants to the first year of graduate study enrolled in your department in each academic year, by citizenship and part-vs-full-time status?	U.S. Citizens	Full-time students				ID 1-10
		Part-time students				11-13 14-16 17-19
	Foreign Citizens	Full-time students				20-22 23-25 26-28
		Part-time students				29-31 32-34 35-37

EMPLOYMENT OF NEW PHD'S

	Academic Year Ending June 1969 U.S. Cit.	June 1969 For'n Cit.	June 1970 U.S. Cit.	June 1970 For'n Cit.	PLEASE DO NOT WRITE IN THIS COLUMN
2. How many PhD's (or equivalent) were granted in your department in each academic year, by citizenship? . . .					38-40 41-43 44-46
Of these new graduates, how many . . .					
a. . . . are currently employed in the United States in activities which appropriately utilize their graduate training?					47-8 49-50 51-2 53-4
(Appropriate work is interpreted to include a faculty or research staff appointment in any university, college, or junior college, a research or research administration position in industry, government or elsewhere, or any professional position which was the deliberate choice of the graduate.)					55-6 57-8 59-60 61-2
b. . . . are in military service?					63 64 1 80
c. . . . are employed in the U.S. in positions which do NOT utilize their graduate training?					ID 1-10
d. . . . have left the United States for other than postdoctoral training?					11-2 13-4 15-6 17-8
e. . . . are unemployed and NOT seeking employment?					19-20 21-2 23-4 25-6
f. . . . are unemployed and seeking employment?					27-8 29-30 31-2 33-4
g. . . . are in postdoctoral training?					35-6 37-8 39-40 41-2
h. . . . are there whose present status is unknown?					43-4 45-6 47-8 49-50
(Items a through h should total to line 2)					51-2 53-4 55-6 57-8
3. Of the postdoctorals in (g), how many are now in training in your own department?					59-60 61-2 63-4 65-6
4. Of those in (3), how many are simply being retained because they have been unable to find appropriate work elsewhere?					67-8 69-70 71-2 73-4 2 80

Please turn the page for items about postdoctorals

POSTDOCTORALS

(See definition on accompanying sheet)

	Academic Year Ending June 69 U.S. Cit.	June 69 For'n Cit.	June 70 U.S. Cit.	June 70 For'n Cit.	June 71 U.S. Cit.	June 71 For'n Cit.
5. How many postdoctorals from all sources were in residence in your department during each academic year?						
Of these, how many ...						
a....were *retained* from previous academic year because their training was incomplete?						
b....were *retained* for lack of suitable employment elsewhere?						
c....were *new* postdoctorals from your own dep't.?						
d....were *new* postdoctorals from outside your department?						
e....were in some other category? (Please specify)_____						
(a through e should sum to line 5)						

EMPLOYMENT OF POSTDOCTORALS

	Academic Year Ending June 69 U.S. Cit.	June 69 For'n Cit.	June 70 U.S. Cit.	June 70 For'n Cit.	June 71 U.S. Cit.	June 71 For'n Cit.
6. How many of those postdoctorals who were in residence in your department in each academic year, have left your department? ..... (Enter total number who have left)						
Of these, how many ...						
a....are now in postdoctoral *training* elsewhere?						
b....are now *employed* in academic positions?						
c....are now *employed* in appropriate nonacademic positions?						
d....are now *employed* in INAPPROPRIATE WORK? (see definition in 2a)						
e....are now UNEMPLOYED and seeking work?						
f....are now UNEMPLOYED and NOT seeking work?						
g....are there whose present status is unknown?						
(a through g should sum to line 6)						

7. If your department is currently retaining postdoctorals for lack of suitable opportunity, are you defraying their stipends from (check as many as apply) research grants ____; training grants____; university fellowship funds ____; teaching staff funds____; deferral of equipment expenditures ____; other sources (please specify)_____

RESEARCH SUPPORT FOR FACULTY

8. How many recent appointees (appointed within the last two years) to your faculty have sought and been unable to secure an initial research-support grant?_____

9. How many members of your continuing faculty who had previously had research support have lost it and are now without it?_____

10. How many (full-time equivalent) faculty members do you have at present? _____

Please feel free to add comments on a separate sheet which may be attached to this report.

Signed _____ Date _____

Title _____ Department _____

Institution _____

Please return this questionnaire as soon as possible in the accompanying self-addressed envelope to the Manpower Studies Branch, Office of Scientific Personnel, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

DEFINITIONS AND INSTRUCTIONS FOR COMPLETION OF EMPLOYMENT SURVEY

GRADUATE STUDENTS

"New entrants for the first year of graduate study" means those new students to your department who, at the time of enrollment, had completed less than one year of graduate study. Students with more than one year of graduate study are considered to be beyond the "first year" status, even though it is the first time enrolled in your department. Graduate students who enroll later than the fall of a given year, but are in residence for the major portion of the academic year are counted as if they had enrolled in the fall, for each academic year indicated.

EMPLOYMENT OF NEW PhD's

Please note the distinction between *employment* and postdoctoral *training* (see definition below). For the purpose of this report, a person in postdoctoral training is not considered to be "employed." Please enter each individual *only once*, in the most appropriate category. If two categories are judged equally appropriate, use the first one on the list. The sum of categories a through h should equal the top line of Item 2.

POSTDOCTORALS

This term has been used in many ways. The meaning intended here is that used in the NAS-NRC publication *The Invisible University: Postdoctoral Education in the United States*, in which the postdoctoral is defined as one holding an

> "appointment of a temporary nature at the postdoctoral level . . . intended to offer an opportunity for continued education and experience in research, usually, though not necessarily, under the supervision of a senior mentor. The appointee may have a research doctorate (e.g. PhD, ScD) or professional doctorate (e.g. MD, DVM) or other qualifications which are considered equivalent in the circumstances. A person may have more than one postdoctoral appointment during his career."

EMPLOYMENT OF POSTDOCTORALS

Item 6 refers back to Item 5, and therefore should not have a larger number than the first line of Item 5. In accordance with the definition of postdoctoral above, a distinction is made in the questionnaire between regular employment (Items 6b, 6c, 6d) and postdoctoral *training* (Item 6a) which is intended as a shorthand term for the definition of postdoctoral appointment given above. The sub-categories of Item 6 (a through g) are intended to be mutually exclusive, or non-overlapping. Each individual should be counted only *once*, in the category that best describes his present status.